

From Mangroves to Democracy:

Citizen Science Case Studies from the San Juan Bay
Estuary.

Cuenca del Estuario de la Bahía de San Juan



How we promote Citizen Science?

- Science is not an exclusive discipline of the Academia, private industry and the State. People can produce useful knowledge to take action in their communities and improve their environment.
- Collaboration among several sectors of society.
- Provide citizens with the necessary tools and training-workshops
- Assist the citizens in the interpretation of the data



Red Mangrove Restoration Project

From seed to tree: can you measure it?



2009



2014





Removing the PVC tubes

Developing Scientific Citizens through volunteer service



Water Quality Monitoring with Volunteers Program

Scientific citizens in action

- Certification on SJBEP's Water Quality test protocols
- On-hand experience on the field
- Over 70 citizens have participated in the project

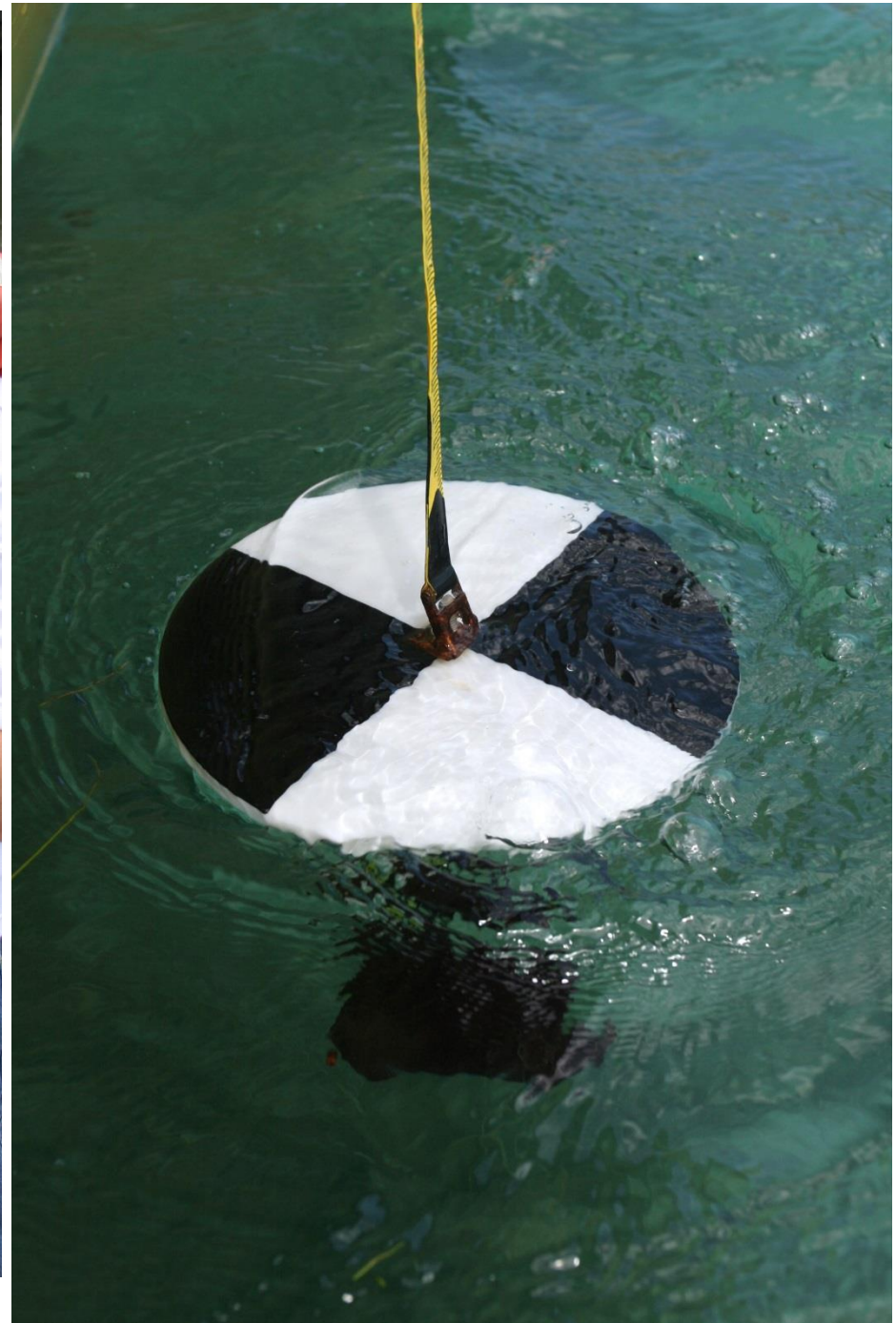


Scientific citizens support monitoring efforts in 25 locations in our watershed



- Increase knowledge of the SJBE communities
- Inter-disciplinary experience







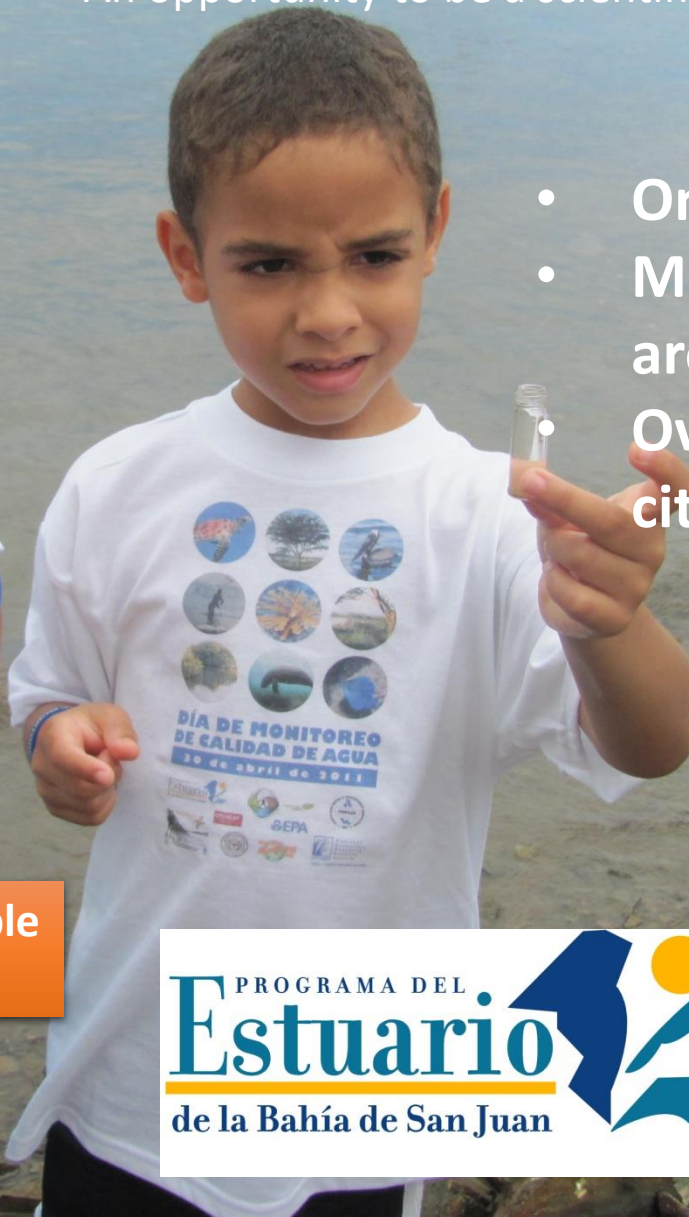
- Interaction with community members



Puerto Rico Water Monitoring Day

An opportunity to be a scientific citizen for one day!

- One day
- Multiple location around the Island
- Over 1,500 citizens



An opportunity to connect the people
with the bodies of water.





A worldwide
movement to
involve citizens in
science.

2013

52 countries



Involving government, private sector and NGO's in water quality monitoring

Environmental Protection Agency, Caribbean Office

Puerto Rico Water & Environmental Association

World Water Monitoring Day Organization

Puerto Rico Natural and Environmental Resources Department

Jobos Bay National Estuarine Reserve

Tetra-Tech, Inc.

Tomas Cuerda, Inc

Hach Corporation



TETRA TECH

Water Quality Monitoring Day

Affordable and easy to use kits

What we test?

Dissolve Oxygen, pH, Ammonia, Nitrate/Nitrite
Turbidity and temperatura.





Sites Monitored

World Leaders in Sites Monitored	
United States	12,522
Taiwan	4,239
Spain	784
Mexico	162
Romania	130
All Others	716
TOTAL	18,553

U.S. Leaders in Sites Monitored	
Florida	10,143
Colorado	418
California	242
Puerto Rico	193
Texas	155
All Others	1,371
TOTAL	12,522

Worldwide Leaders 2013

Puerto Rico was #4 World Leader in Sites Monitored



Participants Visits

World Leaders in Participant Visits	
Taiwan	92,023
United States	39,761
Cameroon	21,843
Spain	16,307
Romania	1,940
All Others	13,091
TOTAL	184,965

U.S. Leaders in Participant Visits	
Florida	19,830
California	1,799
Puerto Rico	1,699
Colorado	1,520
Texas	470
All Others	14,443
TOTAL	39,761

Almost #5 in total worldwide participants

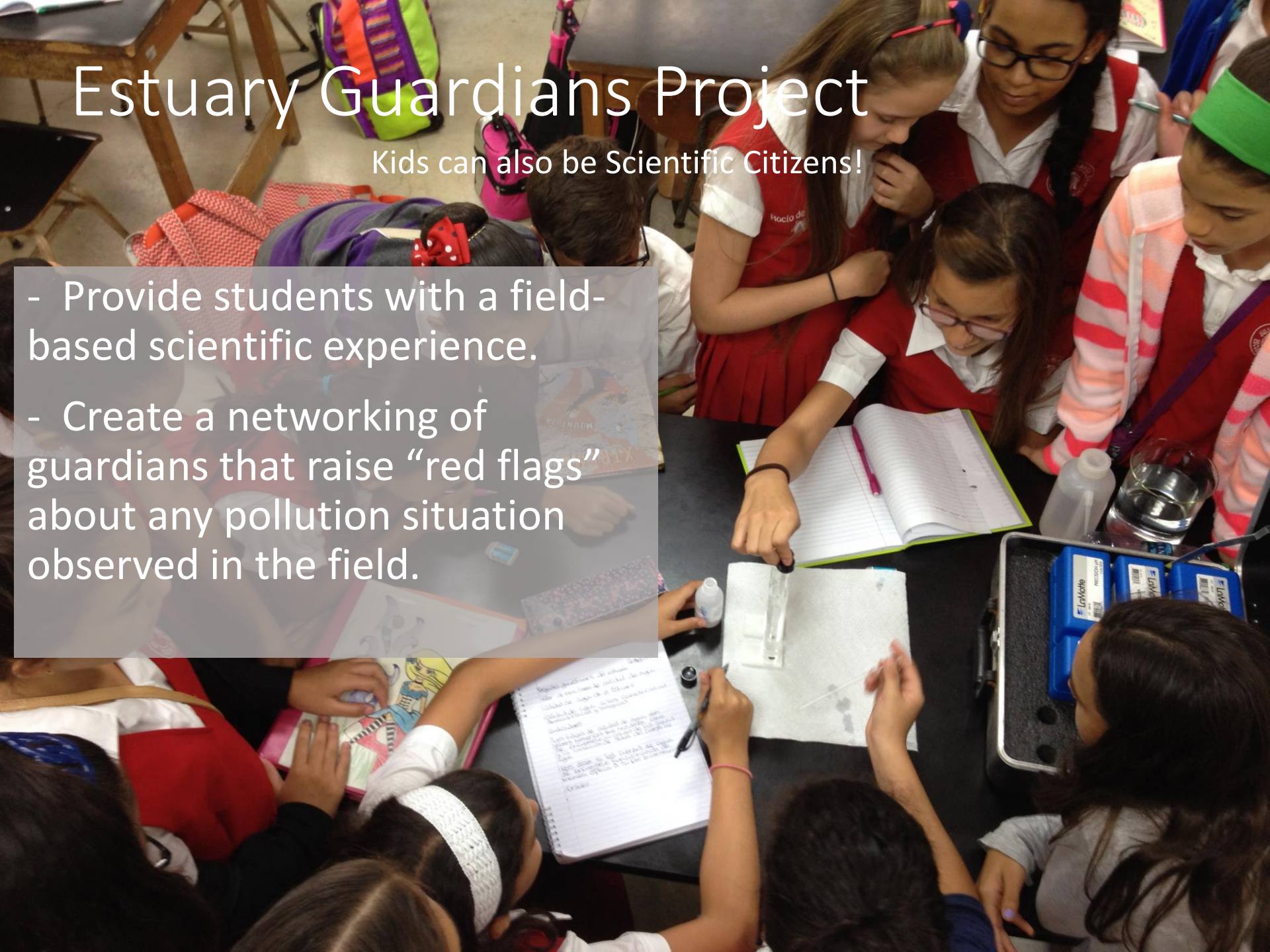
Puerto Rico 3.6 Million of habitants – 1,699 participants visits

Romania 21.33 Million of habitants – 1,940 participants visits

Estuary Guardians Project

Kids can also be Scientific Citizens!

- Provide students with a field-based scientific experience.
- Create a networking of guardians that raise “red flags” about any pollution situation observed in the field.



Estuary Guardians Project

Kids can also be Scientific Citizens!



- Since 2008
- Over 1,000 students
- Public and private schools



Estuary Guardians Project

Kids can also be Scientific Citizens!



School Yard Gardens



Stormwater markers project

Learning about non-point source pollution





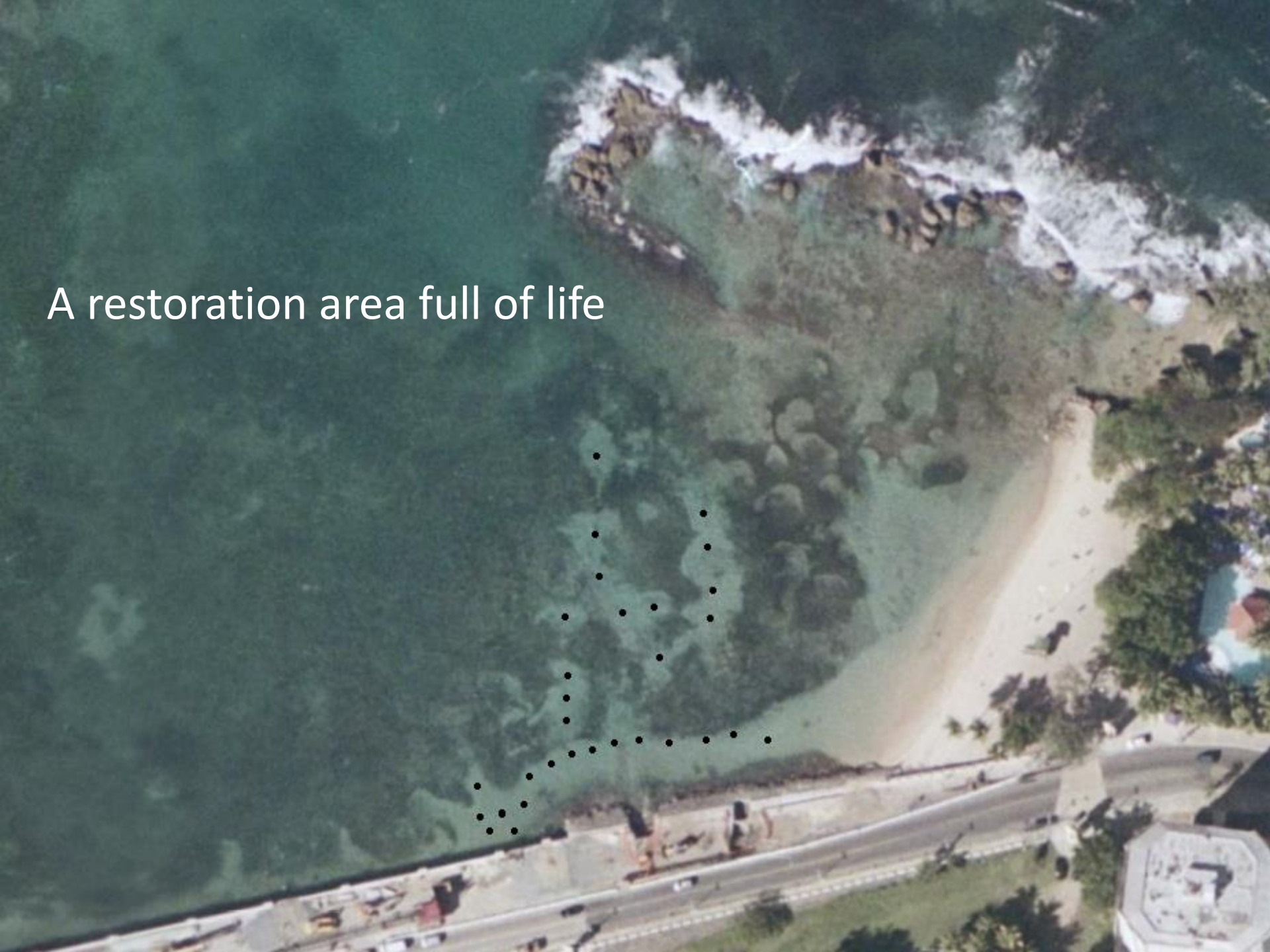
Nonpoint source
pollution
prevention-
Stormwater

Artificial Reefs

Fish census



A restoration area full of life



Fish census- 90% increase in fish population

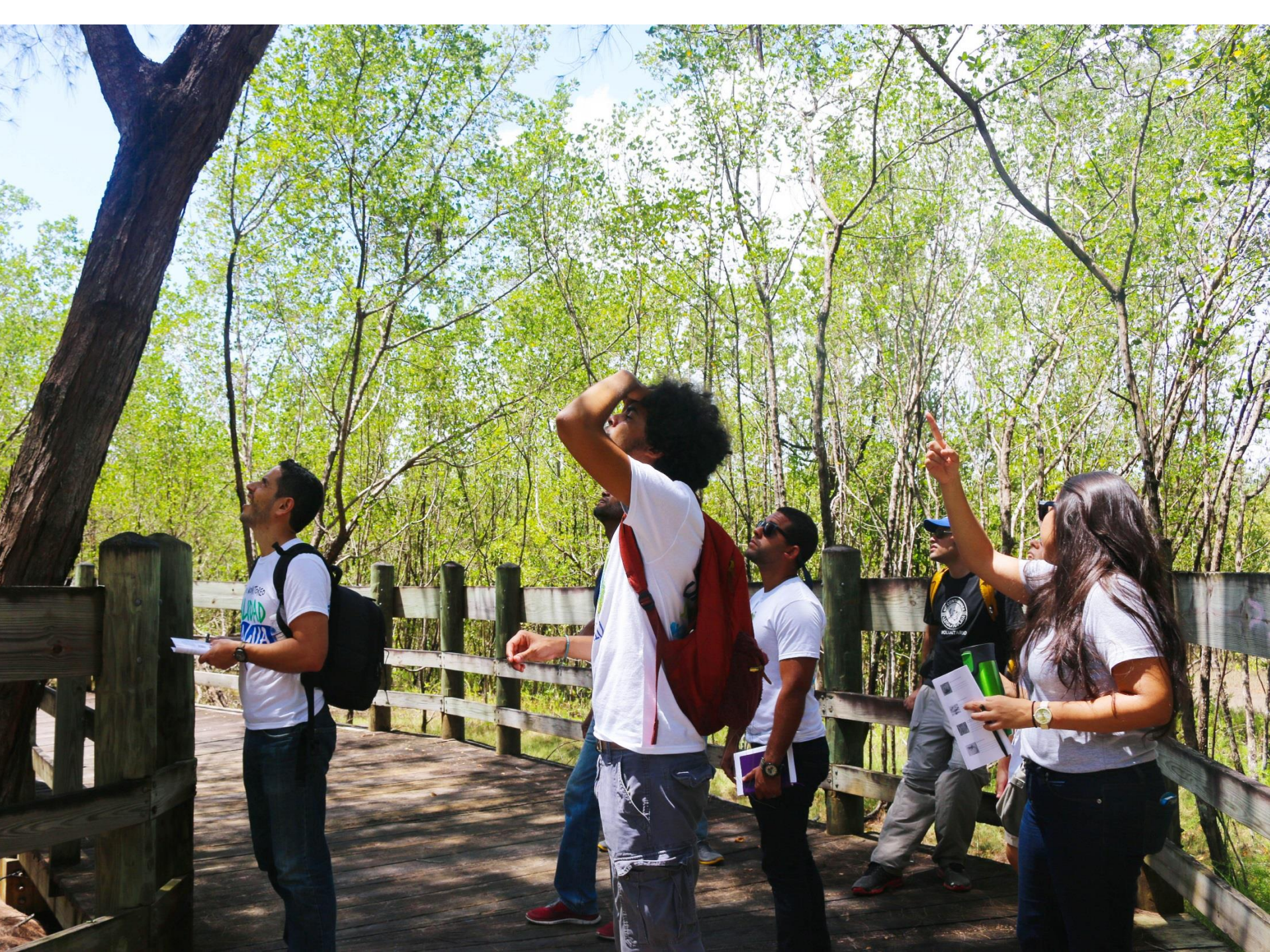






Annual bird census with citizens





Debris characterization





